



December 17, 2018

NG-18-0145
10 CFR 50.73

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

Duane Arnold Energy Center
Docket 50-331
Renewed Op. License No. DPR-49

Licensee Event Report 2018-004

Please find attached the subject report submitted in accordance with 10 CFR 50.73. This letter makes no new commitments or changes to any existing commitments.

A handwritten signature in black ink, appearing to read "Dean Curtland".

Dean Curtland
Site Director, Duane Arnold Energy Center
NextEra Energy Duane Arnold, LLC

cc: Administrator, Region III, USNRC
Project Manager, DAEC, USNRC
Resident Inspector, DAEC, USNRC

IE22
NRK



LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

(See NUREG-1022, R.3 for instruction and guidance for completing this form
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to infocollections.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. Facility Name Duane Arnold Energy Center	2. Docket Number 05000-331	3. Page 1 OF 4
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4. Title
Automatic Reactor Scram Due to Feedwater Regulating Valve Failure

5. Event Date			6. LER Number			7. Report Date			8. Other Facilities Involved	
Month	Day	Year	Year	Sequential Number	Rev No.	Month	Day	Year	Facility Name	Docket Number
10	19	2018	2018	004	00	12	17	2018	N/A	N/A
									Facility Name	Docket Number
									N/A	N/A

9. Operating Mode 1	11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (Check all that apply)			
	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
10. Power Level 100%	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> 73.77(a)(1)
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 73.77(a)(2)(ii)
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 73.77(a)(2)(iii)
	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> Other (Specify in Abstract below or in NRC Form 366A)		

12. Licensee Contact for this LER

Licensee Contact Bob Murrell, Licensing Engineer	Telephone Number (Include Area Code) 319-851-7900
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13. Complete One Line for each Component Failure Described in this Report

Cause	System	Component	Manufacturer	Reportable To ICES	Cause	System	Component	Manufacturer	Reportable To ICES
B	SK	CON	N/A	Y	N/A	N/A	N/A	N/A	N/A

14. Supplemental Report Expected

☐ Yes (If yes, complete 15. Expected Submission Date) ☒ No

15. Expected Submission Date

Month	Day	Year
N/A	N/A	N/A

Abstract (Limit to 1400 spaces, i.e., approximately 14 single-spaced typewritten lines)

On October 19, 2018, at 1725 while operating at 100% power, the 'B' Feedwater Regulating Valve (FRV; CV1621) failed closed resulting in lowering reactor level and subsequent automatic reactor scram on low level. This resulted in a 4 hour event report to the NRC under 10CFR50.72(b)(2)(iv)(B) for actuation of the Reactor Protection System. This report also included reports for emergency core cooling systems (High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC)) discharge into the reactor coolant system under 10CFR50.72(b)(2)(iv)(A), and a valid actuation of the Primary Containment Isolation System under 10CFR50.72(b)(3)(iv)(A) (reference EN#53676). The FRV was subsequently repaired and the reactor was started up on October 21, 2018. The direct cause of the failure was a broken conductor within the FRV position modulator (ZM1621). The root cause of this event was the fact that design choices made by the vendor resulted in a less robust wire connection. This event was of low safety significance and had no impact on public health or safety. There were no systems, structures, or components inoperable at the time of the event and none that contributed to the event. This event is reportable pursuant to 10CFR50.73(a)(2)(iv)(A). There were no radiological releases associated with this event.

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

(See NUREG-1022, R.3 for instruction and guidance for completing this form
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1. FACILITY NAME		2. DOCKET NUMBER	3. LER NUMBER		
Duane Arnold Energy Center		05000-331	YEAR	SEQUENTIAL NUMBER	REV NO.
			2018	- 004	- 00

NARRATIVE**I. Description of Event:**

On October 19, 2018, at 1725 while operating at 100% power, the 'B' Feedwater Regulating Valve (FRV; CV1621) (SK - Feedwater Pump Injection and Miscellaneous System) failed closed resulting in lowering reactor level and subsequent automatic reactor scram on low level. This resulted in a 4 hour event report to the NRC under 10CFR50.72(b)(2)(iv)(B) for actuation of the Reactor Protection System (JD – Reactor Power Control System). This report also included reports for emergency core cooling systems (High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC)) discharge into the reactor coolant system under 10CFR50.72(b)(2)(iv)(A), and a valid actuation of the Primary Containment Isolation System under 10CFR50.72(b)(3)(iv)(A) (reference EN#53676). There were no systems, structures, or components inoperable at the time of the event and none that contributed to the event.

After subsequent troubleshooting, the FRV was repaired and the reactor was started up on October 21, 2018.

The direct cause of the FRV failure was a broken conductor within the FRV position modulator stepper motor.

II. Assessment of Safety Consequences:

This event resulted in an automatic initiation of the reactor protection system on low reactor water level. All rods inserted into the core as designed. After the scram, due to void collapse, level fell to the Level 2 (vessel low-low level) setpoint where the HPCI and RCIC systems automatically initiated and injected into the reactor core. HPCI, RCIC, and the 'A' Feedwater system restored level to Level 8 and the pumps automatically tripped off as designed. Subsequently, the operating crew took control of the plant and maintained vessel level via Feedwater and Condensate systems and removed decay heat via the Main Condenser.

An immediate investigation of the event determined that the plant and operator response was as expected. Therefore, this event was of low safety significance and had no impact on public health or safety. There were no systems, structures, or components inoperable at the time of the event that contributed to the event. There were no radiological releases associated with this event.

This event did not result in a Safety System Functional Failure.

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III. Cause of Event:

A root cause evaluation was completed for this event and the following root and contributing causes were determined:

Root Cause: Design choices by the vendor resulted in a less robust connection that ultimately led to the broken conductor within the FRV position modulator.

Contributing Cause: Routine preventative maintenance damaged the connection over time.

IV. Corrective Actions:Immediate Corrective Action

The failed connector was replaced in the October 2018 forced outage under Work Order (WO) 40627947-01.

Corrective Actions to Prevent Recurrence

Replace 'A' FRV stepper motor connectors with a more robust design at the next available opportunity.

Corrective Actions for Root and Contributing Causes

Generate Preventative Maintenance tasks to periodically replace the 'A' and 'B' FRV stepper motor connections.

V. Additional Information:Previous Similar Occurrences:

A review of NextEra Energy Duane Arnold LERs from the previous 5 years found no other instance of an event related automatic reactor scram.

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				2018	- 004	- 00

ELIS System and Component Codes:

SK - Feedwater Pump Injection and Miscellaneous System

JD - Reactor Power Control System

Reporting Requirements:

This activity is being reported pursuant to the requirements of 10CFR50.73(a)(2)(iv)(A).